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12.0 CONSTRUCTION REHABILITATION

12.1 INTRODUCTION

Construction rehabilitation occurs during and after the construction phase of the project. Construction rehabilitation includes thermal and hydraulic erosion control, visual impact amelioration, as well as habitat restoration and enhancement. Rehabilitation relies on physical, chemical, and biological measures for insuring surface stabilization and succession potential, using either natural vegetation or a desirable alternative, on terrestrial and riparian areas disturbed during construction. Accordingly, basic cleanup will follow construction, which in turn will be followed by the appropriate rehabilitation process. This document does not cover rehabilitation associated with the operation and maintenance or the demolition, removal, and restoration phases of the project, although similar rehabilitation methodologies may be implemented for those activities. Rehabilitation for these phases of the project will be addressed in subsequently developed operations and maintenance and demolition, removal, and restoration plans. See also: 1) the Environmental Information Supplement, Environmental Management Program (ENVIS01) for coordinating with all the environmental protection programs; and 2) Environmental Information Supplement, Fish and Wildlife Protection (ENVIS07).

Rehabilitation strategies and methods require flexibility in order to accommodate short notice design changes (field modifications) to alleviate unforeseen problems that will occur under diverse environmental conditions. These conditions necessitate the wide use of qualitative methods to assess sites and to determine the proper restoration technique.

This section contains general design criteria applicable to the rehabilitation of the right-of-way during the construction phases of the project. It does not attempt to present a detailed rehabilitation plan for the project. Rehabilitation activities include grading of surface materials, active revegetation, and passive revegetation through the encouragement of native plant reestablishment, habitat restoration and visual impact amelioration. For the purposes of this section, the following assumptions are made:

- All surface disturbances that occur during construction will be rehabilitated in accordance with approved plans. This includes at a minimum, disturbances to the pipeline right-of-way, access roads, material sites, disposal sites, storage yards, compressor stations, mainline valve sites, camp sites, staging pads and other unanticipated disturbances.
- Rehabilitation treatments are applied only after sites are stable. Where erosion may be a source of site instability, see Section 11, Drainage and Erosion Control, for erosion control considerations, analysis and measures.
- Planning and design for rehabilitation of all surface disturbances will consist of the following three phases:
  - Phase I – Initial rehabilitation design will include current industry practices and practices developed after gathering pre-construction information.

  - Phase II – During construction the rehabilitation plans will be reviewed with respect to actual field conditions to ensure the appropriate rehabilitation treatment has been identified. If required, alternative treatments may be incorporated into the rehabilitation plans at this time.

  - Phase III – During post-construction the treatments identified in Phases I and II will be finalized to reflect as-built conditions and then implemented.

- Facilities (i.e., compressor stations, camps, and access roads) required for operation and maintenance of the pipeline will not be rehabilitated until they are retired from service. However, areas immediately adjacent to the permanent facilities will be rehabilitated to the greatest extent practicable.
- This ROW Rehabilitation section supports and is supported by other sections in this volume, in particular, Section 5, Material Sites; Section 6, Spoil Disposal; Section 9, Workpad Design; Section 11, Drainage and Erosion Control; and Section 1, River, Stream and Wetlands Crossings.

  The criteria and procedures presented in this section are intended to guide the designer through a series of steps by which rehabilitation treatments are selected, refined, and implemented throughout the design and construction cycle. Detailed planning documents will be developed and they will reflect up-to-date design criteria and rehabilitation techniques.

12.2 CODES AND CRITERIA

12.2.1 Codes

- Alaska Statutes, Title 16, Fish and Game
- Alaska Statutes, Title 38, Public Lands, Chapter 35, Right-of-Way Leasing Act
- Alaska Statutes, Title 27.19 Alaska Mining Reclamation Act
- Alaska Administrative Code, Title 18, Section 70, Environmental Conservation, Water Quality Standards
- Alaska Administrative Code, Title 11, Chapter 80, Natural Resources, Pipeline Right-of-way Leasing
- Alaska Administrative Code, Title 11, Chapter 97, Natural Resources, Mining Reclamation Regulations
- Code of Federal Regulations, Title 18, Conservation of Power and Water Resources
- Code of Federal Regulations, Title 33, Navigation and Navigable Waters
- Code of Federal Regulations, Title 43, Public Lands: Interior, Part 23, Surface Exploration, Mining and Reclamation of Lands

- Mineral Mines Leasing Act (Statute 437): Section 185, Right-of-way for Pipelines through Federal Land (30-USC-185)
- Federal Right-of-Way Grant for the Alaska Natural Gas Transportation System Alaska Segment, Serial No. F-24538 (December 1, 1980), as such may be updated and/or amended from time to time.
- Federal Energy Regulatory Commission conditional certificate of public convenience and necessity, issued on December 16, 1977, as such is finalized
- Department of the Army Section 10 and 404 Permit, Permit 071-OYD-2-830282 "Sagavanirktok River 120", January 4, 1984 (as modified September 9, 1987). This permit expires September 7, 2007. Special Conditions (28) establish restrictions on the methods, locations, and schedule of construction to protect surface waters and wetlands. Permit is for "C" wetlands only. Work in "B" wetlands requires a site-specific individual permit. (No activity allowed in "A" wetlands).

12.2.2 Criteria

- In general, disturbed areas will receive consideration for the following generic treatments:
  - Redistribution and/or transportation of materials suitable for rehabilitation activities at the site.
  - Final grading and shaping to blend with existing topographical features.
  - Scarification and fertilization, with seeding or planting to follow, as necessary.
  - The evaluation of disturbances to habitat and then the definition and implementation of appropriate restoration treatments which will also provide visual amelioration, as required.
- Planning for rehabilitation of the right-of-way will also include planning for the rehabilitation of all facility sites. Site selection and development based on site layout and orientation, minimal clearing, doglegs in access roads, buffers and vegetated islands will be the key factors considered.
- Rehabilitation of third party properties will be in accordance with the terms and conditions of the agreement with the owner.
- Rehabilitation plans will be compatible with third party structures and facilities.
- Materials suitable for use in rehabilitation (e.g., organics, sandy silts) will be stockpiled on site and utilized for rehabilitation. In those areas where suitable materials are not present, materials may be transported to the site for use in rehabilitation.
- Rehabilitation of drainages, fish bearing streams and rivers will be addressed in the following

manner:

- All major rivers and fish bearing streams will be returned to approximate original or better conditions based on the following factors: stream banks, vegetation, pool/riffle ratio, width, depth, substrate, and gradient. Rehabilitation will be completed such that natural conditions (e.g., flows) are maintained, fish passage, over-wintering, and spawning is assured, and long-term stabilization is achieved.

- All temporary and permanent drainage structures and erosion and sediment control measures will be designed in accordance with Section 11.

- All drainage structures not needed for operation or maintenance of the pipeline system will be removed; the disturbed area rehabilitated, and block points established.

- Habitat restoration means the rehabilitation of selected fish and wildlife habitats. Candidate sites include, but are not limited to, fish bearing streams, Category A and B wetlands, riparian habitats, sensitive wildlife areas, and areas converted from terrestrial to aquatic habitat. Sites will be selected based on factors such as the degree of impacts (e.g., channelization of fish bearing streams) and the sensitivity of the habitat affected (e.g., cutting through ice-rich stream banks).

- Where visual amelioration is required, preventive measures will be incorporated into the final design. If preventive measures are not feasible, mitigative measures will be developed and implemented. The following considerations will be made:
  - Consider potential alternative use of site, facility or area in designating special visual amelioration treatment.
  - Consider operations and maintenance requirements in designating special visual amelioration treatments.
  - Consider reducing landform and/or vegetation contrast.
  - Consider blending site or facility with adjacent terrain features.
  - Consider minimizing site visibility from public travelways and site-specific public use areas.
  - Use other rehabilitation treatments to satisfy visual amelioration whenever possible.

12.3 Design Procedures

The basic assumption in the right-of-way rehabilitation is all disturbed areas will be stabilized during construction. However, if unexpected instability occurs (e.g., unstable cut slopes, longitudinal slopes, ice cuts, cross slopes and thaw unstable soils) the treatments

described in Section 11 and the procedures outlined in the Erosion and Sedimentation Control Design Manual will apply. Generic rehabilitation treatments as identified in Section 12.2.2 will apply for the various site types. Additional procedures for the rehabilitation of sites based on the nature of the project-related disturbance are provided in the following sections for the right-of-way, access roads, material sites, spoil disposal sites, solid waste disposal sites, gravel pads for temporary facilities and other sites as described.

12.3.1 Rehabilitation by Site Types

Specific rehabilitation plans will be developed for each type of site. The initial step in selecting treatments is to identify and prioritize the goals for rehabilitating a particular site. These goals will be based on site type, projected long-term use, site stability evaluations (vulnerability to thermal, hydraulic, or wind erosion degradation), visual impact, and importance of wildlife or fish habitat. In many instances rehabilitation will involve the reestablishment of native plant communities and erosion control. However, in areas, such as roadside embankments where the use is to support and protect the traffic surface or where erosion control through vegetative cover is a primary objective, priority will be given to alternate goals such as site stability. The following provides general information that would be included in each plan based on the site type.

12.3.1.1 Construction Right-of-Way

The workpad will be constructed on ice or snow, engineered fill, or original ground surface, dependent on site-specific conditions. Overburden and spoil produced from the construction of the work pad or the excavation of the trench may require treatment. At a minimum, the rehabilitation treatments will address the following factors:

- Trench Spoil Requirements (see Section 6)
  - Temporary stockpiling as well as final disposition
- Workpad Requirements (see Section 9)
  - Treatments to rehabilitate each construction activity; evaluation of workpad after ice melt to verify appropriate rehabilitation measure; grading and contouring of fill slopes to natural appearance and seeding as necessary to prevent erosion and provide fish and/or wildlife habitat.

12.3.1.2 Temporary Access Roads

Rehabilitation for temporary access roads will include the following:

- Removal of all drainage structures.
- Restoration of aquatic habitats.

- Removal or upgrade of all temporary erosion control structures.
- Blockage of all access points.

12.3.1.3 Material Sites

Where overburden material (e.g., organics and mineral soils) is not suitable for construction material, it will be segregated and stored for use in rehabilitation. Other rehabilitation techniques will be incorporated into each mining plan, on a site-specific basis, utilizing concepts such as vegetative buffers and vegetative islands. These techniques will be used to encourage native plant reinvasion of disturbed areas or for habitat restoration. A selection process will be used to determine site-specific rehabilitation treatments. The following types of sites will have at a minimum the noted treatments applied, if appropriate:

- Active floodplain site.
  - Unused stockpiles will be removed or distributed over the surface of the excavated area.
  - Channel diversions and levees will be removed.
  - Site will be graded to approximate the natural stream geometry such that fish passage is assured, natural stream conditions (e.g., flows) are maintained, and fish entrapment is prevented.
  - Substrate will be restored.
  - For additional final grade information see Section 5.
- Rock quarry site.
  - Surface materials stored on site will be distributed over the pit floor.
  - Quarries will be developed with ledges to prevent animal falls and establish escape routes.
- Unforested alluvial fan site.
  - The excavated area will be graded to restore channel flows and drainage patterns such that fish passage is assured, approximate natural stream conditions (e.g., flow, bank stability and channel morphology) are maintained, and fish entrapment is prevented.
  - Surface materials stored on site will be distributed over the excavated area.
  - The pit slopes will be graded to provide a smooth transition between undisturbed and disturbed areas.

- First level river terrace site.
  - Surface materials stored on site that are suitable for rehabilitation will be utilized to restore the site.
  - Stored materials will be evenly distributed over the disturbed area.
  - Pond development will be addressed on a site-specific basis and will employ the following concepts: irregular shorelines, variable depths, and vegetated islands within the ponded area.
  - If ponds are connected to fish bearing streams, fish passage will be established and all attempts will be made to design the connecting stream so it is similar to the channel morphology of other streams in the river basin (same hydrologic area).

- Upland site or forested alluvial fan site.
  - Surface materials stored on site that are suitable for rehabilitation will be utilized at the site.
  - Materials will be distributed as evenly as possible over the disturbed area, matching contours where possible.
  - In general, pond development in areas mined below the water table will be addressed on a site-specific basis and will employ the following concepts: irregular shorelines, variable depths, and vegetated islands within the ponded area.
  - On such sites, stored surface materials suitable for rehabilitation will be utilized to restore the site.

12.3.1.4 Spoil Disposal Sites

All efforts will be made to utilize any topsoil generated from project construction. This will help minimize the need for these sites.

In general, spoil disposal sites will be graded to match the local contours, stabilized for erosion control and revegetated. Revegetation will match the surrounding ecoregion.

12.3.1.5 Solid Waste Disposal Sites

- Rehabilitation of solid waste disposal sites will be undertaken on a site-specific basis after site operations are completed. In addition, the following special criteria may apply:
  - A minimum three-foot thick cover of compacted sub-soil will be used over the fill area.

- The cover will be fine-grained soil ranging from the ML through OH classification of the Unified Soil Classification System.

- A final cover consisting of a minimum of six inches of surface material suitable for rehabilitation will be placed over the three feet of compacted sub-soil.

- Final cover will be graded or crowned to provide drainage away from the disposal area to prevent ponding of water.

Grades will be monitored for settlement to insure that ponding of water does not occur. If such settlement is observed, the appropriate corrective action will be taken.

12.3.1.6 Gravel Pads for Temporary Facilities

The following are general measures for rehabilitating temporary facility sites. Final site rehabilitation will be decided on a site-specific basis with the appropriate landowner.

- Remove all buildings and ensure no contamination to gravel pad.
- Remove gravel pad or leave the pad in place and scarify.
- Fertilize the area.
- Revegetate the area matching the surrounding ecoregion.

12.3.1.7 Disturbed Areas Without Gravel Fill

The following are general measures for rehabilitating disturbed areas without gravel fill. Final site rehabilitation will be decided on a site-specific basis with the appropriate landowner.

- Grade areas to match area contours.
- Revegetate as necessary.

12.3.1.8 Adjacent Facilities

Any adjacent facilities, such as private roads or TAPS facilities, that are modified or damaged during construction will be restored to pre-construction condition or better unless otherwise agreed upon by the owners of the affected facility.

12.3.2 Habitat Restoration

Much of the rehabilitation effort is associated with the restoration of wildlife habitat impacted during construction. Though it may not be possible to return habitat to its exact pre-construction state, restoration allows the habitat to be useful to many plant and animal species. As such, each rehabilitation plan will contain a discussion relative to the effects of habitat restoration and what actions may be taken to ensure successful restoration.

Habitat restoration means the rehabilitation of selected fish and wildlife habitat. Native plant succession will often result in habitat restoration without the utilization of any special restoration treatment. Selected material sites will be designed to pond (see Section 5) which may benefit waterfowl and fish. Edge effects will be increased by leaving buffers between aliquots in selected material sites. Sensitive species will receive special recognition during habitat restoration. Early successional plant species will invade disturbed sites, introducing habitat diversity to many previously monotypic areas.

At other sites or locales, special rehabilitation treatments will be necessary to restore animal habitats. The following description is an example for the rehabilitation for a fish bearing stream that was negatively impacted as a result of construction of the stream crossing and other pipeline construction activities.

Where longitudinal encroachments in existing channels of fish bearing streams have occurred, channels will either be restored or created for fish use. The following procedures and techniques may be employed:

- Channel grade will be restored to approximate pre-construction conditions.
- Channels created for restoration purposes will include similar widths, depths, pools, runs and riffles, and a configuration similar to that of the original stream.
- The substrate will be restored through the use of materials similar in size and composition to those of the impacted streambed.
- In selected sites, streambanks will be restored through revegetation or other natural streambank stabilization methods.

12.3.3 Rehabilitation Scheduling

Rehabilitation is a process that begins with design and continues through construction and post-construction activities. Rehabilitation treatments will be undertaken as soon as practicable within seasonal restrictions as construction of a specific section is complete or use of a specific site is no longer required. Ongoing site-specific evaluations will occur during construction. A final walk-through will be completed at the end of construction or at site closeout to determine whether modifications to rehabilitation design(s) are needed.

Particularly in regions of discontinuous permafrost, there is a period of time after the pipe is installed where erosion and settlement of surface soils could occur. This condition could cause pipe alignment problems and certainly could affect the level of success of the rehabilitation efforts. To help mitigate this concern, areas where the pipe has been installed and that have been rehabilitated, will be monitored. Additional rehabilitation efforts would be employed should the monitoring indicate problems. Details on the methods for monitoring and the decision tree on what fixes should be conducted will be fully discussed in the final rehabilitation plan.

12.3.3.1 Revegetation Windows

Revegetation efforts can be employed in every season of the year except winter. Early winter seeding and fertilization has been successful if seed is applied to the soil surface and then covered with snow. The weather must be cold enough so the seed is dormant until spring.

If temporary seeding is required during the rehabilitation phase, the methods and procedures contained in Section 11 and the Erosion and Sedimentation Control Design Manual will be employed.

12.3.3.2 Windows for Cutting, Seedlings and Transplants

Cuttings, seedlings and transplants will be planted in accordance with the seasonal restrictions identified below:

- Dormant cuttings shall be used and planting should occur as soon as the ground thaws to a depth of 12 inches. Planting shall occur before July 1 for areas north of Milepost 182 and before July 15 for areas south of Milepost 182.
- Seedlings shall be planted as soon as the ground thaws to a depth of 12 inches but before July 15 for areas north of Milepost 182 and before August 1 for areas south of Milepost 182.
- Transplants can be planted as soon as the ground thaws to a depth of twelve (12) inches.

12.3.4 Rehabilitation Success

Rehabilitation success reflects the adherence to effective restoration processes on a site-specific basis.

On stable soils, the following methods or acceptance criteria may be used:

- Growth potential of all stable soils will be site maximized; available surface materials distributed over the site; a minimum six inches of soil scarified to hold seed, trap moisture, and to increase seedling survival.
- All sites not requiring active revegetation must show evidence of reinvasion of native species.
- On sites requiring wildlife or fish habitat rehabilitation, growth potential should be maximized, and the target survival criteria for transplants or cuttings should be met.
- On unstable soils (cut slopes with high content of fine materials or sand), target survival criteria for seeded native grasses should be met.

Generally, greater than 50 percent vegetative cover (including seed and plantings) on low

stability sites after three years or appropriate engineering measures should be judged adequate in controlling stability problems. For example, vertical cut slopes will not easily revegetate but drainage control above them and maintenance of open ditches below them should provide stability for these areas.